

## ABSTRACT

Disclosed is an improved vacuum cleaning apparatus utilizing a self-sustained vortex flow in a centrifugal separator. More specifically, vortex flow is maintained via pressure differentials allowing the ejection of dust and other particles without bags, filters, or liquid baths. Furthermore, the impeller inside of the separator serves the dual purpose of moving air through the system as well as creating a cylindrical vortex fluid flow providing an efficient and simple configuration. Also disclosed herein is a complete toroidal vortex vacuum cleaner in which a toroidal vortex nozzle is used in conjunction with the centrifugal separator. The vacuum cleaner exhibits recirculating airflow that not only prevents unseparated dust from escaping into the atmosphere, but also conserves the kinetic energy of the flowing air. The present invention excels in producing clean air of a better quality more efficiently, more quietly, and more simply than the prior art.